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VIA ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W., Room TW-A325
Washington, D.C. 20554

Re: Written Ex Parte Presentation,
GN Docket No. 18-122: *Expanding Flexible Use of the 3.7 GHz to 4.2 GHz Band*

Dear Ms. Dortch:

We respectfully submit the following comments on behalf of The Church of Jesus Christ of Latter-day Saints (the "***Church***") in the above-captioned matter.

EXECUTIVE SUMMARY

Through its affiliated legal entities, the Church owns and operates one of the largest networks of 3.7-4.2 GHz Band (the "***C-band***") receive-only earth stations in the United States, representing approximately 20% of all earth stations registered with the Commission. The Church's earth station network is vital to the Church's religious mission and the Commission's decision on the various proposals for reallocating the C-band will materially impact the Church's network. Given its substantial investment in the C-band, whether measured in terms of time, money, or importance to the organization's mission, the Church has been following closely the various proposals to reallocate the C-band spectrum and make accommodations for current C-band earth station registrants.

The Church certainly supports the repurposing of spectrum for 5G and recognizes that portions of the C-band may have an important role in that initiative.[1] In pursuing that end, however, the Church urges the Commission to preserve the equally important functions that the C-band supports today. Preserving the benefits of C-band satellite distribution requires two things: (1) ensuring that current C-band users have the flexibility to adopt the technical solutions that work for them; and (2) making certain that all direct and indirect costs of the C-band transition are covered for registered earth station operators, like the Church, that have a recognized protectable interest under the law.

As the Commission formulates a transition plan, the need for flexibility cannot be over-emphasized. Some earth station operators do not see a viable alternative to the C-band, whereas others, such as the Church, could be open to transitioning to the Ku-band, installing a fixed terrestrial solution such as fiber, or implementing some combination of options, assuming all associated transition costs are covered. Accordingly, as discussed in more detail below, the Church urges the Commission to do all of the following:

[1] The Church does not currently take any position regarding the method the Commission should adopt to restructure the band, whether public auction, private sale, or some other approach.

- Allow earth station operators to determine for themselves, for each location or group of locations, the best, long-term transition option, *i.e.*, whether to: (1) install filters and stay in the C-band, (2) transition to the Ku-band, (3) transition to fiber or some other mode of fixed terrestrial delivery, or (4) adopt some other alternative.

- Mandate full and fair reimbursement of each earth station operator's reasonable transition costs, both direct and indirect. Compensation should not be tied to a one-size-fits-all alternative.

- Hold the Transition Facilitator accountable to ensure such reimbursement.

We look forward to the opportunity to discuss these points with Commissioners and staff in the near future, and will be pleased to answer any questions.

DETAILED COMMENTS

I. Earth Station Operators Have a Protectable Interest.

FCC regulations have long recognized that registered earth station operators like the Church have a protectable interest that deserves to be safeguarded. Commission rules state that "[r]eceive-only earth stations . . . may be registered with the Commission *in order to protect them from interference*. . . ."[2] Indeed, as the Commission has acknowledged, while a license is no longer required to operate receive-only earth stations, the voluntary registration of these earth stations is tantamount to a license: "a registration program will afford the same protection from interference as would a license issued under our former [licensing] procedure."[3]

The Church chose to timely register its 3,476 C-band receive-only earth stations to avail itself of the protections afforded by the Commission, and it is grateful to the staff of the International Bureau for their herculean efforts in the ongoing task of processing all of these registrations. The Commission should recognize and confirm that C-band earth station operators have enforceable interference protection rights to the extent necessary to secure their right to be held harmless by any C-band restructuring that the Commission may undertake.

II. The Church's Investment in and Use of C-Band.

The Church is a global denomination with over 16 million members organized into more than 30,000 congregations worldwide. Satellite programming is essential to the Church's religious mission because it allows senior leaders of the Church to communicate with local members and leaders in ways that otherwise would be impossible. The Church began using satellites to distribute programming as early as 1962 and, since 1982, has invested considerable resources—an estimated $70 million—to develop a satellite network that (in North America) functions primarily within the C-band.

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[2] 47 CFR §25.131(b) (emphasis added).

[3] *Amendment of Part 25 Order*, 6 FCC Rcd 17 207, para. 7. In adopting the voluntary registration program in 1991, the Commission noted that "a registration program would provide receive-only operators with interference protection while offering a simpler regulatory procedure." *In the Matter of Amendment of Part 25 of the Commission's Rules & Regulations to Reduce Alien Carrier Interference Between Fixed-Satellites at Reduced Orbital Spacings & to Revise Application Processing Procedures for Satellite Commc'ns Servs.*, 6 F.C.C. Rcd. 2806 (1991). The FCC further clarified, "The information required for an application for registration would be the same as is currently required for a license application but the program would eliminate the issuance of a formal license." *Id.* And the FCC "emphasize[d] that a registration program will afford the same protection from interference as would a license issued under our former procedure." *Id.*

The Church continuously disseminates religious content through this system, but the system's main value is to connect leaders to remote locations through live and tape-delayed meetings, conferences, devotionals, worship services and other events. Initially, beginning in 1962, there were just a few of these events per year. That initial modest utilization has steadily grown over the ensuing decades and the Church now utilizes its satellite system extensively. Since 2003, the Church has aired well over 500 events per year.

Depending on their purpose and target audience, these events may be translated and aired simultaneously in as many as ninety-seven languages. They may be directed to a particular region or selection of regions, or beamed worldwide. They may target Church members only (with encryption to protect the sacredness of the event), a particular age group or other demographic, or may be open to the public generally. Examples of common events include:

- ***General Conferences*:** The Church holds a worldwide general conference each spring and fall. During the worldwide gathering, there are five sessions where members receive instruction from Church leaders. The four separate two-hour sessions on Saturday morning, Saturday afternoon, Sunday morning, and Sunday afternoon are open to everyone. The Church also holds targeted sessions. The Saturday evening session every April is designed for men and boys who are members of the Church. The Saturday evening session every October is designed for women and girls of the Church. Since the vast majority of the Church's members are unable to attend general conference in person, the conferences are transmitted via satellite in several dozen languages to over 7,400 Church buildings in more than 100 countries.[4]

- ***Face-to-Face events for youth*:** Church leaders or other invited guests share inspirational messages and respond to life questions posed live by teens worldwide in an interactive format.[5]

- ***Trainings for local ministry leaders*:** The Church does not have a paid professional clergy; rather, lay members of the Church are called upon to lead local congregations, direct the various ministries to women, men, teens, and children, teach in Sunday services, lead the music, and perform other services to the Church. There is constant turnover in these responsibilities, and thus, a constant need to train. Senior leaders of the Church use the C-band network to provide live training meetings where they introduce resource materials and help local leaders and teachers learn their duties.[6]

- ***Temple dedications*:** In addition to regular Sunday worship, Church members also follow the biblical practice of worshipping in temples. Temples differ from typical houses of worship, called "meetinghouses" (where members meet for Sunday worship services), as temples are considered houses of the Lord where Jesus Christ's teachings are reaffirmed through ordinances that unite families for eternity. In the temple, Church members learn more about the purpose of life and make covenants to follow Jesus Christ and serve their fellow beings. Given the importance of temples, each dedication of a new or remodeled temple is shared live with the meetinghouses in the region that will be served by that temple. These are solemn

[4] *See*, *e.g.*, https://www.churchofjesuschrist.org/general-conference?lang=eng.

[5] *See* https://www.churchofjesuschrist.org/broadcasts/face-to-face/archive?lang=eng.

[6] *See*, *e.g.*, https://www.churchofjesuschrist.org/broadcasts/archive/general-conference-leadership-training/2017/04?lang=eng; https://www.churchofjesuschrist.org/broadcasts/archive/worldwide-leadership-training/2013/06?lang=eng; https://www.churchofjesuschrist.org/broadcasts/auxiliary-training?lang=eng.

services. Only Latter-day Saints who observe the basic principles of the faith may participate, and the transmissions are encrypted to preserve their sacredness.[7]

- ***Other devotionals, conferences, and events***: Other events that the Church shares via satellite with Church members and guests include worldwide devotionals for young adults,[8] an annual worldwide Christmas devotional,[9] celebrations of important historical events,[10] the Brigham Young University Women's Conference,[11] RootsTech (a genealogy convention sponsored by a Church-affiliated nonprofit),[12] funerals of Church leaders, and missionary programs.

A global program or event that is disseminated over the Church's C-band network may be translated into as many as ninety-seven languages, with delivery of multiple languages to a single location being very common.[13]

To receive these programs, the Church has built a nationwide network of at least 3,476[14] C-band downlinks at various locations, primarily meetinghouses, in the United States and its territories. It also has approximately 248 C-band receive-only earth stations in Canada (which receive from the same C-band satellite as the Church's C-band receivers in the United States) and over 1,100 in other countries.

Not all meetinghouses have satellite downlinks—indeed, there are more than 14,000 congregations of the Church in the United States—but the Church ensures that all congregations have reasonable access to a location equipped with an earth station. On average, each of the Church's 3,476 C-band downlinks in the United States serves about 1,600 members of the Church.

Many of these downlinks are in rural areas that are not well served by other modes of distribution. In many rural areas, the Church's earth station is the only downlink in the community. For a graphical depiction that plots the Church's C-band receive-only earth stations in the United States and Canada based on their latitude and longitude coordinates, please see ***Figure 1*** (attached in the Appendix).

III. The Commission Should Ensure Flexibility For Current C-Band Earth Station Operators.

The Church has made a tremendous investment in its existing C-band network. That investment has paid off in the form of a video distribution system that is vitally important to the Church's religious mission. Nonetheless, the Church recognizes the need to make room for emerging technology and is willing consider a change to Ku-band or fixed terrestrial distribution. Part of what drives the Church's willingness to adjust

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[7] As an example, see https://newsroom.churchofjesuschrist.org/article/president-oaks-rededicates-oakland-california-temple (reporting on the recent re-dedication of the Oakland California Temple after a major building remodel). Whereas there are thousands of meetinghouses, there are 161 operating temples, with approximately 40 more temples in some stage of construction.

[8] *See* https://www.churchofjesuschrist.org/broadcasts/worldwide-devotional-for-young-adults?lang=eng&_r=1.

[9] https://www.churchofjesuschrist.org/broadcasts/first-presidency-christmas-devotionals?lang=eng.

[10] *See*, *e.g.*, https://www.churchofjesuschrist.org/broadcasts/archive/be-one-celebration-event/2018/06?lang=eng.

[11] https://www.churchofjesuschrist.org/broadcasts/womens-conference?lang=eng.

[12] https://www.churchofjesuschrist.org/broadcasts/archive/2018-rootstech-leadership-session/2018/03?lang=eng.

[13] Apart from its distribution into meetinghouses, the Church uses C-band satellite services to distribute selected programming to cable TV systems serving over 1,900 municipalities and to some broadcast TV and radio stations. These programs, which are distributed through an affiliated entity, reach millions of homes. In addition, the Church-affiliated Brigham Young University uses a separate C-band satellite network for distribution of its BYUtv channel, on a full-time basis, to cable systems nationwide and direct-to-home satellite TV systems for retransmission. BYUtv is available in approximately 51 million homes in the United States.

[14] The Church does not have a complete record of which meetinghouses have downlinks installed. The Church has definitively located and registered 3,476 C-band downlinks in the United States, but believes there may be others.

to new distribution methods is a desire to encourage greater investment in fiber infrastructure for rural and other underserved communities.

The Church is also motived by concerns about the long-term prospects for use of the C-band for video distribution. If operators like the Church are required to install filters to stay within the C-band now, the Church is concerned that it will be required to transition to yet another solution in the foreseeable future. Thirst for 5G and other future communication technologies will be insatiable. If a permanent solution to this issue requires the Church to limit its use of the C-band, the Church is open to discussing that solution.

But fair is fair. If the Church is required to reconfigure its distribution network to ensure the availability of spectrum for other services, it should be reimbursed for the cost of that transition. Moreover, given the costs and institutional disruption inherent in any major transition, the Church, as a nonprofit religious institution, seeks the flexibility to decide for itself the best, long-term solution for each location and for its network globally, rather than have that decision imposed on it by entities who are focused narrowly on just this immediate transition.

In short, reimbursement to earth station operators should be both sufficient and flexible enough to allow operators to implement reasonable long-term alternatives or a combination of alternatives. Alternatives do exist in some geographies, and the Commission should empower earth station operators who are able to transition out of the C-band to do so voluntarily, using a solution of their own choice.

A. The Need for Flexibility.

The Commission should ensure that registered earth station operators have both the flexibility to determine for themselves how to transition and that all reasonable transition costs are fully reimbursed. At a minimum, reimbursable costs should include the flexibility to choose between different options or a combination of options, including installing filters, transitioning to the Ku-band (or another band), transitioning to fixed terrestrial delivery if fiber is reasonably available in the area, or pursuing some other reasonable alternative that works for the particular earth station operator, as well as all associated administrative and coordination costs.

This flexibility to decide should include the option of batching sites, re-allocating satellite or fixed terrestrial resources from one site to another, or the like. Indeed, because of technical limitations, lack of access to fiber, and/or the obvious need of a large network to avoid relying on a single provider for such a mission-critical service, the Church may not be able to employ the same solution everywhere, and the costs will vary by location. An operator should be able to apply funding to make what it thinks is the best, long-term investment for the site—especially in high-need, low-resource locations—so long as costs are within reasonable limits.

Giving earth station operators the flexibility of transitioning out of the C-band, especially to a fixed terrestrial delivery solution, has a number of benefits. It could reduce the number of earth stations (which could allow other satellite users to expand within the cap set by the Commission), reduce demand for C-band satellite bandwidth if not needed by other satellite users, reduce interference concerns for both satellite users and providers of cellular services, and drive investments in fiber networks that would benefit underserved communities. All of this would further the Commission's stated goals on many fronts.[15]

[15] Indeed, earth station operators should be encouraged to look critically at their networks and to work cooperatively with other stakeholders on the best possible solution, rather than simply accepting a transition within the C-band by default. Some commenters have suggested that the Commission should award incentives. The Church, as a nonprofit, is interested solely in recovering its costs and has no profit motive.

B. Alternatives to C-Band: Ku-Band.

While the Church relies heavily on its C-band network, the Church also has thousands of earth station receivers that operate in the Ku-band. In the United States, it currently has 683 Ku-band antennae, and that number may increase in light of the Commission's current freeze on new C-band earth station registrations. The Church also has successfully used the Ku-band in Latin America, Europe, and Africa (where the Ku-band is often the preferred option). The Church continues to build new meetinghouses as it grows, many of which need satellite downlink capability or another viable solution. With C-band no longer an option and terrestrial fiber infrastructure limited in many communities, the Church is installing Ku-band earth stations at some new meetinghouses.[16] A long-term freeze or restrictions on where C-band downlinks can be installed going forward impairs the Church's use of the C-band over time.

The Church is aware of, and agrees with, commenters who have highlighted the challenges of Ku-band and the need to preserve sufficient C-band capacity for uses that the Ku-band will not support. C-band is certainly the Church's preferred satellite solution, given C-band's superior resistance to weather impairments, generally broader coverage, and the Church's substantial investment in infrastructure. However, the Church is willing to consider transitioning to the Ku-band in order to avoid the risk of potential interference from 5G transmissions, avoid future reallocations of C-band spectrum for 5G services, and to maintain a consistent solution for additions and changes to its network.

In the Church's experience, Ku-band receive-only earth stations are smaller and less expensive than comparable C-band stations. And critically, Ku-band receivers can be fully integrated with the Church's standard audio/visual equipment so transitioning to Ku-band would not diminish the Church's ability to transmit in multiple languages simultaneously, remotely encrypt its programming, rely on non-technical lay members of local Congregations to plug in equipment to receive feeds, provide consistent technical support, or otherwise enjoy the benefits of satellite.

All that said, there are two material challenges to a transition to Ku-band: coverage and cost. With respect to coverage, the Church's current Ku-band satellite capacity does not have broad enough coverage or an orbital position suitable for use at all of the Church's current US receive-only earth station locations. In addition, the Church's satellite provider currently does not have capacity available on a Ku-band satellite that would be suitable for a full consolidation. Thus, without the launch of new Ku-band satellites or additional coverage and availability on existing satellites, it is not possible for the Church to have a single North American solution with Ku-band as it does with C-band. (We include Canada, because the same space stations that serve the United States also serve Canada.) This lack of coverage undermines the Church's goal of being able to transmit on a single space station; use of multiple stations requires more bandwidth and increases costs.[17]

The cost of Ku-band distribution also creates problems. Transitioning from C-band to Ku-band in many existing meetinghouses will require more than simply installing filters; C-band earth stations will need to be removed, disposed of, and replaced. And since Ku-band receivers have a smaller footprint, spaces freed up by replacing C-band receivers will need to be repurposed. Plus, in addition to replacement costs, there may be at least some additional equipment needed to connect the newer Ku-band satellites into the older

[16] The Church agrees with several other commenters who have urged the Commission to lift the freeze on new C-band earth stations. It is not uncommon for the Church to build new houses of worship or to change locations as membership changes. If any portion of the C-band remains open to satellite, earth station operators cannot be permanently locked into current locations; they need the ability to grow, develop, and modify as needed.

[17] As it is, the Church will need to move to a new Ku-band satellite—from Galaxy 28 to Galaxy 16—for better coverage in the continental United States, if it transitions from C-band to Ku-band.

existing A/V systems. All of these costs should be reimbursed as part of the process of reallocating the C-band.

C. Alternatives to C-Band: Fixed Terrestrial Broadband (Fiber).

The Church also is beginning to experiment with internet-based delivery to meetinghouses. Many of the events the Church transmits to meetinghouses via satellite are also streamed online. For example, a recent General Conference had more than 4,275,000 views across five sessions for a total of 3,474,992.65 digital hours viewed in 225 countries.

While the Church does not currently have the infrastructure to provide the full functionality and consistent quality it enjoys on the satellite network if it switched to fiber, it is actively exploring the option for locations with robust and available fiber networks. Many meetinghouses are close enough to existing fiber networks that the Church is willing to consider the possibility of switching to fiber or other fixed terrestrial alternatives in those locations. Of course, as with the transition to Ku-band, challenges must be overcome before a transition from satellite to fixed terrestrial options will be viable. Clearing these hurdles will require an investment of time and resources.

As the Commission is aware, large swaths of the country lack reliable fiber networks, which makes transitioning from satellite to a terrestrial solution highly impractical in those locations. As noted above, many of the Church's C-band earth stations are in rural areas without adequate fixed terrestrial infrastructure. So, even if the Church transitions some urban locations to terrestrial delivery, the Church likely cannot abandon satellite transmission entirely, but will continue to occupy satellite bandwidth until the fixed terrestrial networks expand to reach these rural areas.

For a high level view of the extent of the Church's presence in rural areas without broadband coverage, compare ***Figure 1***, which plots the Church's C-band downlinks based on their GPS coordinates, against the maps contained in Figures 2 and 3 in the Appendix: the Connect America Fund Broadband Map showing areas where fixed broadband has already been deployed (the dark colors) and where it has not been deployed (***Figure 2***); and the Connect America Fund Phase II: Auction 903 Results map showing that, as of April 3, 2019, 103 bidders won contracts worth $1.49 billion over 10 years to provide fixed broadband to over 700,000 locations in 45 states (***Figure 3***). Note that gray shaded areas in Figure 3 represent regions where there was no winning bidder or the winning bidder defaulted by notifying the Commission that they did not intend to pursue at least a portion of their successful bids.

Even a cursory comparison of these three maps demonstrates that the Church has C-band receive-only earth stations in numerous rural areas in Arizona, Colorado, Idaho, Nevada, New Mexico, Montana, Utah, and Wyoming (among other states) where there is little or no fiber network. While the recent auction promises to extend fiber to more communities over the coming decade, there are still many communities without any current prospect for reliable fiber broadband delivery.

IV. All Earth Station Expenses Should Be Reimbursed.

A. Commenters Demonstrate a Consensus in Favor of Cost Recovery and the Need for Complete Reimbursement.

The Church is grateful that the Commission and many commenters seem to recognize the substantial investment receive-only earth station operators like the Church have made in C-band and that operators should be reimbursed for their transition costs if the band is repurposed. Indeed, there seems to be

overwhelming consensus on this general principle.[18] The Church is concerned, however, that the particular compensation plans proposed do not anticipate all of the costs that would be borne by earth station operators and that they artificially constrain transition options.

Reimbursement should cover all costs including indirect costs, such as sourcing new systems, devices and software; programming and development software to achieve requirements such as encryption, conditional access, and multi-language synchronization; creating training materials and providing ongoing support to non-technical users on new systems; off-setting the increased ongoing subscription costs for services necessary to a fixed terrestrial delivery system; additional fees to ensure adequate throughput for live programming; removing and disposing of old C-band equipment; re-landscaping a property if an earth station is removed; and other costs.

More study is needed to estimate all the potential transition costs in the three scenarios the Church has considered: (1) install filters and stay in the C-band, (2) transition to the Ku-band, or (3) transition to fixed terrestrial delivery. Based on its own experience, the Church is skeptical of estimates that have been placed on the cost of extending fiber networks nationwide. For example, in Deland, Florida, the cost of bringing fiber to a Church meetinghouse from a fiber connection located *across the street* was estimated to be $10,000. If a single location is that expensive even when fiber is nearby, the cost of fibering locations that are miles from fiber today will be far, far greater. And since neither the Ku-band nor the fixed terrestrial solution is likely to be feasible as a universal solution, there likely will be regional variation in the solutions it selects.

B. Unique Costs Must Be Covered.

i. Church Meetinghouses Have No Technical Staff.

In determining the amount of compensation to be paid to receive-only earth stations, the Commission should keep in mind that reimbursements must include more than the mere cost of equipment installation. This is especially true for the Church, whose 3,476 earth-bound receivers are located at houses of worship where there is no on-site staff.

As explained above, local congregations of The Church of Jesus Christ of Latter-day Saints operate entirely through their lay members, with no paid or professional staff. This sharing of congregational responsibilities among the congregation's members instills the values of community and fellowship and is one of the Church's most defining characteristics. It means that lay members alternately preach sermons and listen to sermons, lead music and sing music, give advice and receive advice, make messes and then clean up the messes.[19] But it also means that a typical congregation would not have anyone with technical expertise to manage satellites. A congregation may appoint a "technology specialist" to learn how to plug in a TV or projector to receive satellite programming, but he or she may have little relevant background and would typically serve in that role only for a short time before passing the role to someone else, who would likewise need to come up to speed.

In addition, meetinghouses are typically locked and vacant during traditional business hours because, with no professional staff, most meetinghouses are occupied only on Sundays, very early on school-day

[18] *See, e.g.*, Reply Comments of American Cable Ass'n, GN Docket No. 180122 at 1-2 (filed Dec. 11, 2018); Comments of AT&T Services, Inc., GN Docket No. 18-122 at 7-10 (filed Oct. 29, 2018); Reply Comments of T-Mobile, GN Docket No. 18-122 at 17-20 (filed Dec. 11, 2018); Reply Comments of NTCA—Rural Broadband Association, GN Docket No. 18-122 at 3 (filed Dec. 11, 2018); Comments of Speedcast Communications, Inc., GN Docket No. 180122 (filed Oct. 29, 2018).

[19] For a more detailed explanation of the Church's lay ministry, please see https://newsroom.churchofjesuschrist.org/article/mormon-lay-ministry.

mornings for youth Bible study classes, and on a few weekday evenings a month for ministry activities and other ad hoc meetings. Thus, technical maintenance or repairs require contacting a regional facility manager who must travel to the meetinghouse to assess the issue or provide access to contractors. Each facility manager coordinates maintenance at dozens of meetinghouses in a region, and then contracts with the Church's third-party property maintenance company to perform the work, which charges an hourly fee to deploy its personnel. Indeed, any installation or change to current infrastructure will require dispatching regional personnel or paid contractors to each site to meet technicians and provide access to the property. Coordinating this work at 3,476 locations nation-wide is not an easy task, especially because one employee or third-party property manager may be responsible for managing multiple sites across large geographical areas. A missing part, missing tool, older technology requiring additional equipment, technician stuck in traffic, or any number of possible contingencies could require longer or additional follow-up visits and added expense. These are not costs that can be easily absorbed. Unlike many commenters, the Church is not-for-profit, its programming is free, and it does not receive advertising revenue. Accordingly, any reimbursement program must provide for staffing costs for earth station owners such as the Church that will need to hire staff to plan, implement, and oversee any equipment changes.

ii. Backend Equipment May Need to Be Replaced.

In addition to the satellite downlink itself, the Church equips all meetinghouses with a standard audiovisual ("***A/V***") system designed with satellite and simplicity in mind. The A/V system seamlessly integrates with the satellite earth station, so that audio and video feeds can play simultaneously in the main sanctuary and other assembly rooms of the building. Conceptually, the system functions like a home cable TV system, where the user can plug in a projector or TV, select an input source, decide whether to turn on closed captioning, and select a desired TV channel; however, the technology is often analog and is always simple to operate. In the Church's system, someone from the congregation plugs a projector or TV monitor into the A/V system, selects the earth station as the source, decides whether to engage closed captioning, and selects the channel for their desired language (each language is transmitted as a separate channel).

In addition, many meetinghouses have a radio system that allows individuals who speak a different language to borrow a radio receiver with headphones, select a different channel with his or her preferred language, and participate in the program or event with simultaneous translation in the same room as the rest of the congregation. A TV monitor tuned to the American Sign Language channel can provide interpretation for the deaf. This system promotes unity as family, friends, and members of the community come together to participate in programs and events as a single congregation, despite language differences or hearing ability.

Currently, if technical difficulties arise, a small support team at Church headquarters can resolve issues over the phone because every location uses the same integrated satellite and A/V system. This unified system is one of the key benefits of satellite—it allows the Church to easily operate a fully supported, fully managed, unified communications solution at houses of worship across the country and around the globe, even though the system is operated on the ground level by non-technical volunteers. The Church's integrated system requires minimal expertise, and allows the Church to provide fast and effective technical support at minimal cost.

If the Church is required to transition some meetinghouses to a different reception format, its current A/V equipment may or may not be compatible. For example, the equipment in older locations is still analog or may not otherwise be able to receive digital transmissions if a location switches to fiber. Accordingly, some of the backend equipment at those locations may need to be replaced if the transmission mode is changed. If so, the cost of replacing that equipment must be fully reimbursed.

iii. A Transition to Fiber Causes Additional Costs.

Several interested parties advocate for moving all current C-band transmissions to fiber. While the Church recognizes and supports the public policy objectives behind moving to fiber, doing so will require the reimbursement of additional costs. At a very high level, to replace a C-band satellite feed, earth station operators, such as the Church, would need new or additional infrastructure along all three phases of fixed terrestrial delivery:

Upload	Live or recorded video and audio feeds are encoded (including encryption), packetized, and uploaded to a server or the cloud via secure internet
Transmit	The video and audio feeds are transmitted by backhaul through data centers (which could be dedicated servers for private use, third-party servers owned by a trusted contract provider, or servers contracted by a value-added reseller of cloud services, depending on the level of security needed) until downloaded from the cloud via the local ISP
Receive	The end user receives the feeds by a device that will decode (and decrypt) the signals, marry the various feeds, and play through the end user's A/V system

The costs to build this infrastructure across all three phases of fixed terrestrial delivery can be substantial for earth station operators, who previously invested in satellite but must replace now-obsolete components with their fixed terrestrial equivalents in order to transition. There are both capital costs and ongoing maintenance costs. Capital costs include installing cable and buying encoders, decoders, and other necessary devices to upload, transmit or receive. As just one example on the receiving end, each receiving location will need a dedicated streaming device/decoder with a player to receive the signals, decode, validate identity, and then play through the local A/V system. Some receiving locations will also need error correction devices in order to ensure quality.

Ongoing maintenance costs will include subscription fees for services like cloud storage, rights management software, and local internet service providers at each receiving location. And because internet connections vary dramatically in quality, and because ISPs are routinely oversubscribed and can block or restrict bandwidth to balance loads, receiving locations may need to pay additional fees for premium services—or perhaps resort to bonding through multiple ISPs—to reserve sufficient throughput for live programming and to reduce latency and jitter. These costs will vary by location. For the Church, which has several thousand meetinghouses, the aggregate of both initial capital costs and ongoing maintenance costs will be significant.[20]

Encryption and conditional access capabilities are also essential for the Church, since some of its most important programming events (*e.g.*, temple dedications) are sacred. Most programs are public and anyone with an earth station tuned to the correct frequency can view them, but some sacred programs and events are intended only for Church members. Each earth station receiver in the Church's network has a unique identifier. When a program or event is restricted, engineers at Church headquarters can remotely assign an encryption tier with a key to earth stations within the Church's network. The program is then transmitted from the source in an encrypted format, and only earth stations with the key can decrypt the signal.

But these features of confidentiality and limited accessibility—inherent in satellite delivery—will require additional programming and devices to achieve if the Church were to move to a fixed terrestrial delivery method. Indeed, the need for these encryption and access controls will likely drive the Church's system specifications. Of course, the most effective way to encrypt and control access to programs—and the

[20] As just one data point, a rough estimate suggests that the aggregate monthly charges to the Church from ISPs would be at least $200,000 per month more than what the Church currently pays for satellite bandwidth.

system most analogous to satellite—would be to establish a dedicated distribution network of private servers and then to encrypt, transmit (which may include bonding), and decrypt transmissions. This may be cost prohibitive, however. A lower cost, more efficient alternative may be to rely on cloud encryption by setting encryption standards, contracting with trusted cloud services providers, and allowing only decoding devices with approved IDs at known locations to download the transmission. This system is not yet developed, and will require custom programming in addition to service costs, but appears feasible at some point in the future.

The system must also support program transmission in multiple languages. Ideally, the programmer will packetize the transmission into separate video and audio feeds, which the decoder will then synchronize when the receiving location selects its preferred language(s). However, unlike satellite, a fixed terrestrial digital player may not support two languages at once. Each language feed may require a separate decoder. Moreover, fixed terrestrial platforms often have a short delay, resulting in an "echo effect" that makes it difficult for different language speakers to watch the program in the same room, even if the new platform is integrated into the building A/V system that allows for use of radio receivers and headphones. Thus, playing multiple languages simultaneously—a critical requirement for many meetinghouses—will require investment in programming and perhaps custom devices.

Finally, all these changes will require program management costs, including additional staff to source devices and services, manage installation and programming, and then provide training and support to local congregations. Again, non-technical Church members in local congregations need guidance on how to install and connect these systems, and then to troubleshoot problems that arise when installing devices, in interacting with the ISP, or in connecting to individual programming streams, especially since fixed terrestrial systems are more complex with more need for technical intervention. Where technical expertise is needed, the Church will incur the cost of retaining vendors for those services, such as its third-party property maintenance company.

The Church is willing to consider transitioning to fixed terrestrial delivery in areas with robust internet, provided that its reasonable costs are reimbursed and there is adequate time for the transition. Preliminary estimates suggest that the Church would likely need two years to transition to fixed terrestrial delivery of programming into meetinghouses in locations where a fiber network is available. However, as discussed above, the Church will continue to require satellite access (through C-band or Ku-band) in areas without robust internet. Accordingly, if the Commission adopts a fiber solution for the C-band reallocation, C-band use should be allowed until a compensated transition is provided at all locations.

C. Concerns with the C-Band Alliance Customer Commitment Letter.

Whereas many interested parties advocate for moving some (or all) of C-band earth stations to fiber, the C-Band Alliance's Customer Commitment Letter offers only to install filters (or provide limited reimbursement in connection with installing filters) and does not address all the actual administrative and coordination costs the Church would incur in installing filters. As noted above, the Church's lay ministry means that the Church will necessarily incur administrative costs in the form of travel expenses and/or the cost of retaining the Church's third-party property maintenance company even if only to unlock meetinghouses and coordinate schedules with installers. These costs must be reimbursed.

Of greater concern to the Church, the Customer Commitment Letter does not contain any flexibility that would allow the Church to pursue other, longer-term solutions; the letter focuses solely on keeping customers within the C-band. Incurring the cost to install filters on thousands of receive-only earth stations may not be wise if, as several commenters have proposed, the entire C-band may become available to wireless phone providers in the next five or ten years. For the Church, given the large number and

nationwide locations of its receivers, flexibility to decide for itself whether to install a filter, a Ku-band receiver, fiber, or pursue a different solution at each particular location, or cluster of locations, is vital.

The Customer Commitment Letter offered by the C-Band Alliance is problematic because (1) it does not contemplate the administrative costs of operators or (2) give customers the flexibility to pursue alternative solutions to the proposed restructuring. The Church is in discussions with its satellite provider, Intelsat, regarding this issue. The discussions have been productive, and the Church is hopeful for a positive resolution. However, no matter the approach the Commission selects to reallocate the C-band, the Commission should mandate—and hold the Transition Facilitator accountable to ensure—that all reasonable transition costs of operators are fully reimbursed and that operators have the flexibility to decide for themselves how they will transition.

V. Additional Comments

In addition to the foregoing, the Church notes the following points:

- Some commenters have proposed auctioning different amounts of the band in every Partial Economic Area ("***PEA***"), which could require earth station operators to receive the same programming stream at different frequencies depending on the location. Simultaneous transmission on multiple C-band satellite frequencies works against the Commission's stated objective of clearing the maximum amount of C-band satellite bandwidth for reallocation for 5G services. This also would be a difficult outcome for the Church because each frequency change must be done manually on site by a contractor, and cannot be done remotely. It would be impractical for a large network such as the Church's to switch to another frequency as a satellite operator may require or to choose an alternate satellite for its programming needs. The Church divides its membership into regions that likely will not coincide with the PEAs established in an auction. As noted above, the Church has a very large network of receiving earth stations that are operated by lay volunteers and overseen by a small support staff in Utah. If frequencies vary based on region, changing frequencies and keeping track of which earth stations need to be tuned to which frequency will be a daunting and expensive task.

- Restructuring the band in the United States will affect the Church's C-band network internationally. The Church has C-band receivers on both sides of the U.S.-Canada border that receive programming streams from the same Intelsat satellite. Although Canada is outside the Commission's jurisdiction, it should be aware that changes on the U.S. side could create coordination problems and the additional cost of leasing bandwidth from multiple space stations unless meetinghouses in Canada are able to also transition. We encourage the Commission to coordinate with Canadian regulators to ensure consistency of approach.

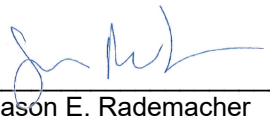
- The Church agrees with commentators who urge the Commission to lift the freeze on new C-band earth stations to accommodate growth and other adjustments. For the Church, it is not uncommon to build new houses of worship or to change locations as its membership changes. If any portion of the C-band remains open to satellite, earth station operators cannot be permanently locked into current locations; they need the ability to grow, develop, and modify as needed.

VI. Conclusion

The failure to adequately protect registered C-band earth stations could have a substantial impact on the Church's ability to fulfill its global mission. The Church urges the Commission to recognize the difficulties

earth station operators face and require sufficient compensation to registered earth station operators. The Church also urges the Commission to give operators the flexibility they need that utilize all alternatives, including filters, transitioning to Ku-band, transitioning to fixed terrestrial delivery, or some combination of those solutions.

Respectfully submitted,



Jason E. Rademacher
Christina Burrow

Counsel for The Church of Jesus Christ
of Latter-day Saints

APPENDIX

GRAPHS

Figure 1 **C-band Receive-Only Earth Stations of The Church of Jesus Christ of Latter-day Saints in the United States and Canada**

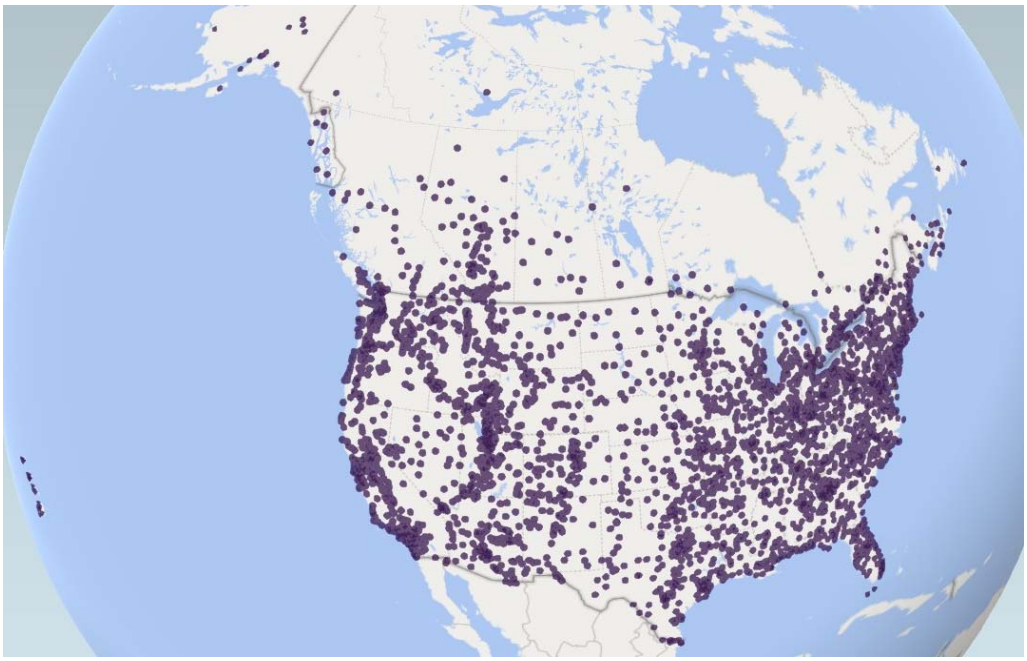


Figure 2 **Connect America Fund Broadband Map**, showing areas where fixed broadband has already been deployed (the dark colors) and where it has not been deployed (everywhere else). *See* https://data.usac.org/publicreports/caf-map/

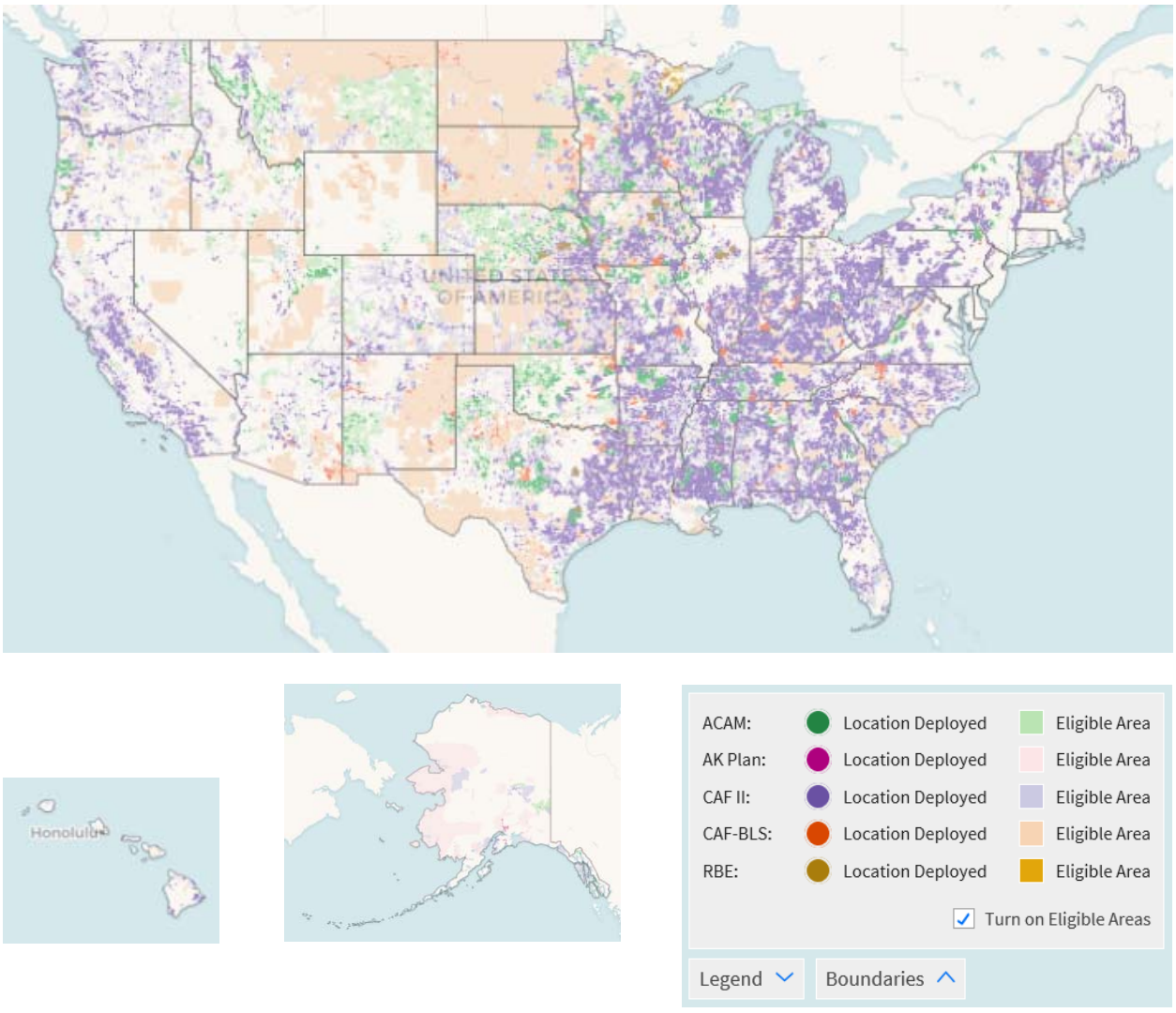


Figure 3 **Connect America Fund Phase II: Auction 903 Results**, showing that, as of April 3, 2019, 103 bidders won contracts worth $1.49 billion over 10 years to provide fixed broadband to over 700,000 locations in 45 states. *See* https://www.fcc.gov/reports-research/maps/caf-ii-auction-results-april-2019/